MANAGEMENT PROBLEMS AND OPPORTUNITIES

OPPORTUNITIES FOR STREAM FISHERY CONSERVATION IN THE FABIUS RIVER WATERSHED

The following perspectives on problems and opportunities for watershed management will guide MDC management priorities and activities for the foreseeable future. We realize we are only one of many partners whose joint efforts will be needed to protect and restore stream ecosystem integrity in the Fabius River watershed.

MANAGING MDC RIPARIAN OWNERSHIPS

Stream Access Acquisition

MDC has purchased small tracts of land along streams in order to provide public access for recreation and to establish an ownership stake which may strengthen our position in resisting system-wide threats to riparian habitat integrity. In the past, statewide planners have assumed that a desirable spacing was approximately ten stream miles between access areas. Experience suggests that it takes much longer to float and/or fish a typical reach of prairie stream than an equivalent length of Ozark stream. Because of slower currents and more frequent channel obstructions in the prairie region, we should seek to shorten the distance between access areas to 5-7 miles on floatable, unchannelized prairie streams with high public use potential.

In order to provide a stream access system with optimal one-day trip distances, MDC should acquire at least two additional access sites in the Fabius River watershed--one located on the South Fabius River between Black Hawk and Sunrise accesses (preferably at T59N, R6W, S31), and another located on the Middle Fabius River between Deer Ridge and Tolona accesses (preferably at T61N, R8W, S12).

Stream Access Development

Because of fiscal constraints, planned developments have not been completed on all existing stream access areas. Developments must be completed so citizens can experience the quality recreational opportunities that will build their individual commitment to helping preserve and restore streams in this watershed. As a matter of strategic priority, MDC will complete planned developments on existing areas before acquiring many additional areas.

Development of Soulard Access on the Fabius River mainstem is largely complete (parking lot, privy, and concrete boat ramp). In addition, angler-accessible rock barbs (short jetties) have been installed on this Stream Demonstration Area in order to correct a streambank erosion problem and improve instream habitat. One of these rock barbs could be fitted with a

concrete pad and sidewalk to accommodate disabled anglers. This would provide the only stream fishing site accessible to disabled anglers in the Northeast Region. Other stream access development needs in the Fabius River watershed are listed in Table 15.

Table 15. Development needs on existing stream access areas in the Fabius River watershed as of March, 1999.

Access Area Name	Stream	Development Need
Tolona	Middle Fabius	Entrance road, 5-car parking area, concrete boat ramp, bank protection
Deer Ridge	Middle Fabius	Entrance road, 5-car parking area, concrete boat ramp
Sunrise	South Fabius	Entrance road, 5-car parking area, concrete boat ramp, bank protection
Dunn Ford	South Fabius	Concrete boat ramp
Black Hawk	South Fabius	Concrete boat ramp

Site-Specific Stream Habitat Restoration

Although stream ecosystem health is almost entirely dependent upon processes occurring upstream and downstream of any given ownership, Department of Conservation riparian areas should serve as models of good stream stewardship. In the Fabius River watershed, streambank erosion and forested corridor deficiencies have been corrected at stream access areas like Soulard and McPike. However, extensive bank erosion problems remain at Sunrise Access on the South Fabius River and Tolona Access on the Middle Fabius River. At such areas, MDC should stabilize eroding banks and establish forested corridors in order to normalize the rates of channel movement and sedimentation while providing a source of large woody debris as fish structure.

Public Use Information

Public use of Fabius River watershed streams is generally low, partially because most people are unaware of the high-quality fishing/floating opportunities that exist there. People who enjoy Ozark streams may have stereotyped northern Missouri streams as turbid, unattractive ditches that contain primarily non-game fish. While this may be true of some highly altered channels in the prairie region, several streams in the Fabius River watershed flow along impressive limestone bluffs and through scenic forested corridors. Most support diverse aquatic communities which provide good fishing for an even greater variety of sport fish than exist in many Ozark streams.

MDC could increase public use and appreciation of Fabius River watershed streams by developing a brochure describing stream recreational opportunities. Such a brochure would include colored pictures, simple stream maps with mileages, access sites, and camping areas clearly marked, descriptions of other local attractions, and fishing opportunities/regulations. Statewide news releases and an article in the *Conservationist* magazine might also help to inform potential users of the opportunities awaiting them in the Fabius River watershed.

CONSERVATION OF AQUATIC COMMUNITIES

Statewide, the Department of Conservation is developing a long-term Resource Assessment and Monitoring program (RAM). The objective is to establish standardized sampling methods for several stream ecosystem attributes, especially biotic communities, that will allow scientists to provide an accurate, legally defensible portrayal of conditions and trends. Sampling will occur at random and fixed sites to allow statewide or individual watershed assessments. Information gathered from this effort may be used to prioritize watersheds for conservation.

Long-Term Fish Community Monitoring

Long-term monitoring to assess stream fish community trends has not been conducted in the Fabius River watershed. Although some sites within the basin may be included in the statewide RAM program, extensive sampling within that framework is not likely to occur for several years. In the meantime, in order to monitor trends in fish community composition and population levels, the Department of Conservation should conduct fish community surveys at sites randomly selected from among those surveyed during 1988-1989 (Table 11) at least every ten years in each sub-basin as follows: Fabius--one site; North Fabius--three sites; Middle Fabius--five sites; South Fabius--five sites.

Fishery Management and Research Needs

Stream fish communities in the Fabius River watershed seem to be imbalanced. Surveys have revealed the existence of relatively few fish-eating predators (flathead catfish, black bass, or walleye/sauger) but large numbers of insect-eating bottom feeders (channel catfish, river carpsuckers, freshwater drum, common carp, and a variety of native minnow species). Non-game fishes are represented mostly by species tolerant of the shallow depths and shifting substrates caused by excessive watershed erosion and subsequent stream channel sedimentation. Shifting substrates dramatically reduce biological productivity, so in channelized streams the large populations of insect-eating fish are almost entirely dependent upon terrestrial inputs or whatever invertebrate production occurs on in-channel woody debris. There are not enough predatory fish

Table 11. Fish sampling site locations in the Fabius River watershed, 1988-1989.

North Fabius Fish Sampling Sites		Middle Fabius Fish Sampling Sites		South Fabius Fish Sampling Sites	
Station Number	**Legal Description**	**Station Number**	**Legal Description**	**Station Number**	**Legal Description**
10	nw¼35 66n13w	26	ne¼23 65n13w	42	ne¼06 61n10w
9	sw¼06 66n13w	25	n½08 64n12w	41	n½13 60n09w
8	sw¼05 66n14w	24	se¼04 64n13w	40	ne¼23 59n07w
7	e½05 66n12w	23	s½09 65n14w	39	se¼14 62n12w
6	se¼31 66n12w	22	ne¼28 64n12w	38	nw¼18 63n12w
5	ne¼27 65n11w	21	ne¼12 64n12w	37	nw¼03 62n12w
4	ne¼19 64n10w	20	se¼13 63n12w	36	ne¼16 60n10w
3	se¼16 61n07w	19	ne¼02 62n11w	35	ne¼08 60n10w
2	e½1960n06w	18	se¼04 62n10w	34	ne¼36 61n11w
Fabius River at>	<Soulard Access	17	e½10 62n10w	33	ne¼11 59n09w
1	se¼19 59n05w	16	se¼01 62n10w	32	sw¼03 58n07w
		15	n½14 63n11w	31	sw¼21 59n08w
		14	s½09 62n09w	30	nw¼21 59n06w
		13	se¼03 61n08w	29	se¼16 61n12w
		12	s½24 60n07w	28	nw¼33 61n11w
		11	nw¼05 60n07w	27	ne¼29 60n10w

to control the abundant insect-eating fish. Degraded habitat may be the main factor limiting predator abundance and thereby preventing ecosystem balance.

We know very little about the migration patterns and minimum habitat requirements of the key predator--flathead catfish. Also, we do not know if the relative scarcity of flathead catfish is due to overharvest under liberal regulations, illegal harvest, habitat deficiencies, or some combination of factors. We need basic research, starting with studies of flathead catfish movement and exploitation rate, in order to begin developing a broad range of strategies for

effectively managing sport fishes in streams (e.g., regulation, stocking, and information/education in addition to habitat protection/restoration).

There is also a high-priority need for information on the movement and habitat use patterns of reintroduced lake sturgeon. These endangered fish were stocked by the Department of Conservation into Pool 24 of the Upper Mississippi River starting in the late 1980s and continuing well into the 1990s. We do not know the extent to which reintroduced lake sturgeon will pass through the navigation locks or seasonally migrate upstream in systems like the Fabius. A radiotelemetry study to identify movements and key habitats used by lake sturgeon would aid in restoring a viable population of this state endangered species.

Monitoring Contaminants in Fish

Fish contaminant monitoring has not been conducted within the Fabius River watershed as of 1998. However, the basin is included in a limited consumption advisory issued by the Missouri Department of Health for fish species with a high proportion of fat in their edible tissues (catfish, carp, buffalo, drum, suckers). Levels of concern for chlordane were reported in the early 1990s for catfish in neighboring watersheds and the Mississippi River.

The Department of Conservation should include the Fabius River watershed among those from which periodic samples are collected for purposes of determining whether a limited consumption advisory is warranted. If contaminant concentrations are below action levels, the Department of Health may wish to reconsider the broad advisory currently in effect.

Long-Term Mussel Community Monitoring

Mussels are abundant in basin streams. Qualitative mussel surveys were conducted in the three main streams of the Fabius River watershed in 1991; but extensive, basin-wide surveys have not been conducted. The Department of Conservation needs to assess species diversity and abundance by conducting a carefully designed, system-wide survey. Survey sites and sampling periodicities should be consistent with RAM and other fish survey protocols.

SUPPORTING OTHER AGENCIES AND ORGANIZATIONS

The Missouri Department of Conservation works with many other governmental agencies and private conservation organizations in the process of managing stream resources. The following formal or traditional interactions are among the most significant in frequency and scope, and they should be continued:

Missouri Department of Natural Resources (DNR)

MDC assists DNR by periodically nominating pristine or otherwise valuable stream reaches for "Outstanding State Resource Water" status; recommending water quality standard classifications for stream reaches of special concern; and assisting in water pollution investigations whenever an event results in the loss of aquatic life. In such cases, MDC's role is to document the number of dead fish and other aquatic organisms and report to DNR the estimated value of animals lost according to formulas established by the American Fisheries Society. MDC should continue its coordination efforts with DNR in order to ensure efficient use of state government resources in the conservation of streams in the Fabius River watershed.

Missouri Department of Health (DOH)

MDC assists DOH by periodically collecting fish from select streams and preparing tissue samples for analysis of pesticide and heavy metal contaminants. We cooperate with DOH in advising anglers about precautions to take in the consumption of fish. MDC should proceed with plans to collect tissue samples from carp and bass in the South Fabius River at Black Hawk Access approximately every three years.

U.S. Army Corps of Engineers (COE)

MDC joins several other agencies in commenting to COE and DNR about activities in streams which require permit under Sections 404 and 401, respectively, of the federal Clean Water Act. COE requires a Section 404 permit for operators who propose to deposit or stockpile material in stream channels; and DNR requires a Section 401 permit for any activity that could significantly degrade water quality. MDC biologists help to disseminate information about stream-friendly sand and gravel removal practices to county commissions, contractors, and landowners.

MDC personnel are often the first agency representatives contacted by neighbors when individuals or public entities engage in what appear to be unpermitted and destructive practices in and along streams. Several serious incidents of Section 404 violation in the Fabius River watershed (mostly Troublesome Creek) since 1980 have prompted MDC biologists to assess impacts and recommend potentially acceptable terms of mitigation or restoration. However, only the COE or EPA (Environmental Protection Agency) can impose such requirements. MDC biologists should remain vigilant advocates for the interests of all riparian residents, upstream and downstream, who may be adversely affected by the activities of those few who knowingly violate Sections 404 or 401 of the Clean Water Act.

MDC recognizes that regulations are necessary to protect streams and their watersheds. Previous hopes that voluntary efforts alone would afford reasonable protection were unrealistic. Watershed management must be approached in a balanced, market-based manner that falls somewhere in the continuum between regulatory protection and voluntary conservation efforts.

Conservation Federation of Missouri (CFM)

MDC facilitates and promotes Stream Team, a program initiated by CFM which seeks to enlist volunteers in the stream conservation effort. As of fall 1998, only two Teams had adopted streams within the Fabius River watershed--Team #448 (Middle Fabius River) and Team #1009 (South Fabius River). Far more citizen interest and volunteer effort will be needed for any significant stream improvements to occur within the Fabius River watershed.

ASSISTING CITIZEN-LED WATERSHED CONSERVATION EFFORTS

We are convinced that the watershed conservation approach will work only if there is widespread recognition that social, economic, and environmental values associated with streams are compatible. If that can be achieved, success will depend upon local initiatives to form diverse partnerships of committed groups and individuals under the leadership of landowners and other local interests.

Watershed restoration is essential to restoring the primary processes that create and maintain fish habitat in healthy stream ecosystems. The most critical and affordable first step in watershed restoration is *passive* restoration--the cessation of human activities that are causing degradation or preventing recovery (e.g., channelization, riparian corridor clearing, indiscriminate gravel dredging, and streamside livestock grazing). *Active* restoration (e.g., tree revetments and riparian corridor tree plantings) should be considered only if recovery fails to occur over a reasonable period of time while using *passive* techniques (e.g., livestock exclusion and natural regeneration of woody plants). Because restoring degraded stream ecosystems is more costly and risky than simply protecting fully functional sites, we suggest that protecting and preserving intact riparian ecosystems be the highest priority of watershed-scale restoration efforts.

Protecting Healthy Riparian Corridors -- Stream Stewardship

A program aimed at conserving healthy forested stream corridors by placing them into permanent easements using Stream Stewardship Agreements (SSA) was piloted in Marion County between 1992 and 1995. That effort resulted in the permanent conservation of 88 acres of 100- to 200-foot-wide forested corridor on four ownerships along 2.4 miles of the South Fabius River.

The infrastructure now exists for MDC to facilitate the permanent conservation of healthy stream corridors, but measurable impact will require funding from a variety of sources. Enrollment of streamside lands in continuous CRP (Conservation Reserve Program) will not substitute for enrollment in SSA or other permanent easement programs because healthy forested corridors cannot be enrolled in CRP, and land enrolled in CRP buffers may be converted back to crop production at the end of short-term contract periods (10 to 15 years). However, CRP may provide a viable first step for landowners on the long path toward converting eroding floodplain cropfields or pastures into functional riparian corridors.

Passively Restoring Mildly Degraded Riparian Corridors -- Livestock Exclusion

The activity of livestock can degrade physical aspects of water quality by causing streambank erosion, resulting in turbidity and stream channel sedimentation. Chemical aspects of water quality can be degraded by livestock waste products. In some situations, streambank healing, corridor reforestation, and improved water quality can be achieved simply by excluding livestock from stream corridors. For fencing to be attractive to landowners, an alternative source of livestock water must be available (e.g., upland ponds, or shallow floodplain wells tapped by nose pumps or solar-powered pumps). Some landowners may have potential alternative water sources on their property, but may not have the money or the technical support to adopt new technology. Cost-share money for fencing and alternative watering may be available through a variety of federal and state programs. Department of Conservation biologists are available to assist landowners in selecting a practical alternative to instream watering of livestock.

Actively Restoring Moderately to Severely Degraded Corridors

A 75% cost-share program for stream restoration practices (e.g., tree revetments and riparian corridor tree plantings) was piloted by MDC in Sullivan County between 1990 and 1993. The program had no participants, despite the fact that 41% of county landowners were aware of monetary incentives. The program lacked many elements critical to the adoption of innovation in agricultural communities, including relative economic advantage and value compatibility. The problems and their solutions were often complex, and MDC assistance had stipulations (ten-year forested corridors 50 to 100 feet wide) which many landowners were unwilling to accept. The lesson learned? Most rural northeastern Missouri landowners may not be prepared to make the personal sacrifices in time, money, and values needed to restore moderately to severely degraded stream habitats on their property. Available funds might be better spent first on protecting healthy riparian corridors and passively restoring those which are only mildly degraded.

Educating Future Watershed Stewards

Educating our youth about the complexities of watershed processes and problems will be critically important in advancing the science and art of watershed conservation. Today's youth are more technologically oriented and therefore more likely than their predecessors to embrace complex information systems. And because of changes in classroom teaching strategy, they are more likely to work effectively in problem-solving teams once they become adults.

MDC has found that students in and around the 6th grade are particularly receptive to messages about stream conservation because they can understand most concepts and evaluate new ideas with relatively little social or cultural bias. Classroom teachers may find helpful lesson-planning materials in Missouri's *Stream Team Curriculum*, a watershed-based curriculum developed by teachers, for teachers, that will help students to meet environmental education goals in the Missouri Performance Standards.

Junior high and high school students in vocational agricultural programs may also be prime candidates for watershed conservation education because they are more likely than others to become landowners and other important members of rural communities. Involving these students in hand-on stream conservation activities may contribute to the creation of a new generation of landowners committed to stream ecosystem integrity.

CITIZEN PRIMER TO LEADERSHIP IN WATERSHED CONSERVATION

This section is included as a starting point for citizens who wish to lead or contribute significantly to watershed-based stream conservation efforts. The proliferation of information about watershed planning can be intimidating to individuals or groups who have decided that they have a problem they wish to fix. To facilitate that process, we recommend that potential leaders and contributors to watershed conservation efforts first familiarize themselves with a summary of lessons learned over the past decade about what works and what does not. The list in Table 16 combines the *Top 10 Watershed Lessons Learned* published by the United States Environmental Protection Agency (1997) with the ten principles for effectively coordinating watershed-based programs listed by Turner (1997). These documents are highly recommended reading.

Citizens determined to develop and implement watershed conservation plans can also obtain critically important information about organizing and funding such projects by visiting the Internet websites listed in Table 17. These sites contain convenient links to many other sites that, in the aggregate, provide enough information about the watershed conservation process to help any individual or group get started in an informed and effective manner.

Table 16. Ten useful watershed conservation principles.*

1)	For the watershed conservation approach to work, there must be widespread recognition that social, economic, and environmental values are compatible.
2)	Successful watershed conservation requires the formation and support of diverse partnerships under the authority of landowners and other local interests.
3)	Leadership is critical in the watershed approach to conservation.
4)	A good coordinator is key to successful watershed conservation projects.
5)	The best plans have clear visions, goals, and action items.
6)	Good tools (planning guides, technical assistance, and funding sources) are available to help watershed groups achieve their goals.
7)	It is important to start small and demonstrate success before working on larger scales, celebrating even minor success as it occurs.
8)	Plans are most likely to succeed if implemented on a manageable scale.
9)	Public awareness, education and involvement are keys to building and maintaining support for watershed conservation efforts.
10)	Measuring and communicating progress is essential to the success of watershed conservation efforts.

* For EPA Publication 840-F-97-001, call the National Center for Environmental Publications and Information at 1-800-490-9198.

Table 17. Internet websites containing important information for Missouri watershed planners.

Conservation Technology Information Center
http://www.ctic.purdue.edu/
CTIC is a non-profit, public-private partnership equipping agriculture with realistic, affordable, and integrated solutions to environmental concerns.

EPA Watersheds and Wetlands
http://www.epa.gov/OWOW/
This site, created and maintained by the federal Environmental Protection Agency, is a good starting point for information about watersheds and water quality.

Funding Sources for Watershed Conservation
http://www.epa.gov/OWOW/watershed/wacademy/fund.html#forword
This site contains a comprehensive listing of private and public sources of watershed project funding, with links to many individual sites and references to many useful publications.

Know Your Watershed
http://www.ctic.purdue.edu/KYW/KYW.html
This initiative works to encourage the formation of local, voluntary partnerships among all watershed stakeholders for the purpose of developing and implementing watershed plans based upon shared visions of the future.

Missouri Stream Team
http://www.rollanet.org/~streams/
This site provides specific information on activities, programs, and funding sources for volunteers who have adopted Missouri streams or otherwise committed themselves to conserving stream resources in Missouri.

Missouri Watershed Information Network
http://outreach.missouri.edu/mowin/
This site serves as a clearinghouse for information about Missouri watersheds.

River Network
http://www.rivernetwork.org/wag.htm
This organization supports development of local watershed partnerships through its Watershed Assistance Grants program. They seek to fund projects in diverse geographies that have demonstration value on a national scale.